What is claimed is:

1. An optical pickup for a recording medium, comprising:

a light source generating and emitting a light beam;

an objective lens focusing the light beam from the light source to form a light spot on the recording medium;

an optical path changer disposed on an optical path between the light source and the objective lens, altering a traveling path of the light beam incident on the recording medium;

a light beam division and detection unit dividing the incident light beam passed through the objective lens and the optical path changer after being reflected from the recording medium into a first light beam portion and a second light beam portion around the first light beam portion, and detecting first and second detection signals from the first and second light beam portions; and

a thickness variation detection circuit detecting a variation in thickness of the recording medium by subtracting the second detection signal from the first detection signal and outputting a thickness variation signal indicative thereof.

2. The optical pickup as recited in claim 1, wherein the light beam division and detection unit comprises:

a photodetector comprising first and second light receiving portions dividing the incident light beam into the first light beam portion and the second light beam portion around the first light beam portion and photoelectrically converting the first and second light beam portions into the first and second detection signals, respectively.

3. The optical pickup as recited in claim 1, wherein the light beam division and detection unit comprises:

a light beam splitter comprising a first section and a second section, dividing the incident light beam into the first light beam portion and the second light beam portion around the first light beam portion; and

first and second photodetectors receiving the first and second light beam portions from the light beam splitter, and photoelectrically converting the first and second light beam portions into the first and second detection signals, respectively.

4. The optical pickup as recited in claim 3, wherein the first section transmits the first light beam portion of the incident light beam or diffracts the first light beam into a 0^{th} - order beam and the first photodetector receives the transmitted or diffracted first light beam.

5. The optical pickup as recited in claim 3, wherein the second section diffracts the second light beam portion of the incident light beam into a $+1^{st}$ -order or a -1^{st} -order beam and the second photodetector receives the diffracted second light beam.

6. The optical pickup as recited in claim 3, wherein the light beam splitter comprises in the first section a through hole, a direct transmit portion, or a hologram pattern to diffract the incident light beam and to transmit a resulting 0^{th}-order light beam to the first photodetector, and comprises in the second section a hologram pattern to diffract the incident light beam and to transmit a resulting $+1^{st}$-order or -1^{st}-order light beam to the second photodetector.

7. The optical pickup as recited in claim 1, wherein the light beam division and detection unit divides and detects the light beam as a circular or rectangular first light beam portion and as a circular or rectangular second light beam portion surrounding the first light beam portion.

8. The optical pickup as recited in claim 7, wherein the first light beam portion corresponds to 10-90% of the incident light beam.

9. The optical pickup as recited in claim 1, wherein the thickness variation detection circuit amplifies at least one of the first and second detection signals by a predetermined gain factor, and processes the at least one of the first and second detection signals to detect the thickness variation of the recording medium.

10. The optical pickup as recited in claim 1, further comprising:

a spherical aberration compensation element on the optical path between the optical path changer and the objective lens, driven according to the thickness variation signal from the thickness variation detection circuit to compensate for spherical aberration caused by the thickness variation of the recording medium.

11. The optical pickup as recited in claim 10, further comprising:

a collimating lens on the optical path between the light source and the optical path changer, collimating the light beam, which is diverging, from the light source; and

an actuator actuating the collimating lens according to the thickness variation signal detected by the thickness variation detection circuit compensating for the spherical aberration caused by the thickness variation of the recording medium.

12. The optical pickup as recited in claim 11, wherein the spherical aberration compensation element comprises:

a liquid crystal plate; and

a driving circuit driving the spherical aberration compensation element to compensate for spherical aberration caused by the thickness variation of the recording medium by changing a shape of a wavefront of the light beam passing the liquid crystal plate by changing the wavefront of the light beam into an inverse shape.

13. The optical pickup as recited in claim 1, wherein the thickness of the recording medium is a distance between a light incident surface of the recording medium and an information recording surface of the recording medium.

14. The optical pickup as recited in claim 2, wherein the optical path changer comprises:

a beam splitter transmitting the light beam from the light source to the recording medium through the objective lens and reflecting the incident light beam through the objective lens to the photodetector by a predetermined ratio.

15. The optical pickup as recited in claim 1, further comprising:

a collimating lens on the optical path between the light source and the optical path changer collimating the light beam, which is diverging, from the light source; and

a sensing lens on the optical path between the optical path changer and the light beam division and detection unit condensing the incident light beam.

16. The optical pickup as recited in claim 1, wherein the optical path changer comprises:

a polarization beam splitter selectively transmitting the light beam from the light source to the recording medium and reflecting the incident light beam to the photodetector according to a polarization of the incident light beam; and

a quarter-wave plate disposed on the optical path between the polarization beam splitter and the objective lens changing a phase of the incident light beam.

17. The optical pickup as recited in claim 1, wherein the thickness variation detection circuit further comprises:

a gain controller amplifying at least one of the first and second detection signals by a predetermined gain factor *k* prior to subtracting the second detection signal from the first detection signal, adjusting an offset of the thickness variation signal.

18. The optical pickup as recited in claim 1, further comprising:

a blue-light semiconductor laser emitting the light beam having a wavelength between 400 nm and 420 nm, wherein the objective lens comprises a numerical aperture of at least 0.7.

19. The optical pickup as recited in claim 1, wherein the light beam division and detection unit comprises:

a photodetector comprising first, second, and third light receiving portions to divide the incident light beam into the first light beam portion, aligned with an optical axis, and the second and third light beam portions around the first light beam portion and to photoelectrically convert the first, second, and third light beam portions into the first, second, and third detection signals.

20. The optical pickup as recited in claim 19, wherein the first, second, and third light receiving portions are arranged in a direction corresponding to either a tangential or radial direction of the recording medium.

21. The optical pickup as recited in claim 2, wherein a size of the light receiving portion is determined where the first light receiving portion receives 10-90% of the entire incident light beam.

22. An optical pickup for a recording medium, comprising:

a light source generating and emitting a light beam;

an objective lens focusing an incident light beam from the light source to form a light spot on the recording medium;

an optical path changer disposed on an optical path between the light source and the objective lens, altering a traveling path of the light beam incident on the recording medium;

a light beam division and detection unit dividing the incident light beam passed through the objective lens and the optical path changer after being reflected from the recording medium into a first light beam portion and second and third light beam portions around the first light beam portion, and detecting first, second, and third detection signals from the first, second and third light beam portions, respectively;

a thickness variation detection circuit detecting a variation in thickness of the recording medium by subtracting a sum of the second and third detection signals from the first detection signal and outputting a thickness variation signal indicative thereof.

23. The optical pickup as recited in claim 22, wherein the light beam division and detection unit comprises:

a photodetector comprising first, second, and third light receiving portions dividing the incident light beam into the first, second and third light beam portions, receiving the first, second and third light beam portions, and separately and photoelectrically converting the first, second and third light beam portions, respectively.

24. The optical pickup as recited in claim 22, wherein the thickness variation detection circuit amplifies at least one of the first, second, and third detection signals by a predetermined gain factor, and processes the first, second and third detection signals to detect the thickness variation of the recording medium.

25. The optical pickup as recited in claim 22, wherein the first light beam portion corresponds to 10-90% of the incident light beam.

26. The optical pickup as recited in claim 22, wherein the light beam division and detection unit comprises:

a photodetector comprising first, second, and third light receiving portions to divide the incident light beam into the first light beam portion, aligned with an optical axis, and the second and third light beam portions around the first light beam portion and to photoelectrically convert the first, second, and third light beam portions into the first, second, and third detection signals.

27. The optical pickup as recited in claim 23, wherein the first, second, and third light receiving portions are arranged in a direction corresponding to either a tangential or radial direction of the recording medium.

28. The optical pickup as recited in claim 22, wherein the thickness variation detection circuit amplifies one of the first, second, and third detection signals by a predetermined gain factor, and processes the one of the first, second, and third detection signals to detect the thickness variation of the recording medium.

29. The optical pickup as recited in claim 22, wherein the light beam division and detection unit comprises:

a light beam splitter comprising first, second, and third sections dividing the incident light beam into the first light beam portion and the second and third light beam portions around the first light beam portion;

a first photodetector receiving and photoelectrically converting the first light beam portion into the first detection signal;

a second photodetector receiving and photoelectrically converting the second light beam portion into the second detection signal; and

a third photodetector receiving and photoelectrically converting the third light beam portion into the second detection signal.

30. The optical pickup as recited in claim 29, wherein the first section directly transmits the first light beam portion of the incident light beam or diffracts the first light beam into 0^{th} -order beam and the first photodetector receives the transmitted or diffracted first light beam.

31. The optical pickup as recited in claim 29, wherein the second section directly diffracts the second light beam portion of the incident light beam into a $+1^{st}$ -order or a -1^{st} -order beam and the second photodetector receives the diffracted second light beam.

32. The optical pickup as recited in claim 29, wherein the third section diffracts the third light beam portion of the incident light beam into a $+1^{st}$ -order or a -1^{st} -order beam and the third photodetector receives the diffracted third light beam.

33. The optical pickup as recited in claim 29, wherein the light beam splitter comprises in the first section a through hole, a direct transmit portion, or a hologram pattern to diffract the incident light beam and to transmit a first resulting order light beam to the first photodetector and comprises, in the second and third sections, a hologram pattern to diffract the incident light beam and to transmit a second and third resulting order light beam to the second and third photodetector, respectively.

34. The optical pickup as recited in claim 22, further comprising:

a spherical aberration compensation element on the optical path between the optical path changer and the objective lens, driven according to the thickness variation signal from the thickness variation detection circuit to compensate for spherical aberration caused by the thickness variation of the recording medium.

35. The optical pickup as recited in claim 22, further comprising:

a collimating lens on the optical path between the light source and the optical path changer, collimating a diverging light beam from the light source; and

an actuator actuating the collimating lens according to the thickness variation signal detected by the thickness variation detection circuit compensating for spherical aberration caused by the thickness variation of the recording medium.

36. The optical pickup as recited in claim 22, further comprising:

a blue-light semiconductor laser emitting the light beam having a wavelength between 400 nm and 420 nm, wherein the objective lens comprises a numerical aperture of at least 0.7.

37. An optical pickup for a recording medium, comprising:

a light beam division and detection unit comprising receiving portions dividing an incident light beam reflected from the recording medium into a first light beam portion and a second light beam portion around the first light beam portion and converting the first and second light beam portions into first and second detection signals, respectively; and

a thickness variation detection circuit detecting a variation in thickness of the recording medium according to the first and second detection signals and outputting a thickness variation signal indicative thereof.

38. The optical pickup according to claim 37, wherein the thickness variation detection circuit detects the variation in thickness of the recording medium by subtracting the second detection signal from the first detection signal and outputs a thickness variation signal indicative thereof.

39. The optical pickup according to claim 37, further comprising:

a light source generating and emitting a light beam;

an objective lens focusing the light beam from the light source to form a light spot incident on the recording medium; and

an optical path changer disposed on an optical path between the light source and the objective lens, altering a traveling path of the incident light beam.

40. The optical pickup as recited in claim 37, further comprising:

a spherical aberration compensation element on the optical path between the optical path changer and the objective lens, driven according to the thickness variation signal from the thickness variation detection circuit to compensate for spherical aberration caused by the thickness variation of the recording medium.

41. The optical pickup as recited in claim 37, further comprising:

a collimating lens on the optical path between the light source and the optical path changer, collimating a diverging light beam from the light source; and

an actuator actuating the collimating lens according to a thickness variation signal detected by the thickness variation detection circuit compensating for the spherical aberration caused by the thickness variation of the recording medium.

42. The optical pickup as recited in claim 39, wherein the light beam division and detection unit further divides the incident light into a third light beam portion around the first light beam portion and converts the third light beam portions into a third detection signal and the thickness variation detection circuit detects the variation in thickness of the recording medium by a sum of the second and third detection signals from the first detection signal and outputting the thickness variation signal indicative thereof.

43. The optical pickup as recited in claim 39, wherein the thickness variation detection circuit amplifies at least one of the first and second detection signals by a

predetermined gain factor, and processes the at least one of the first and second detection signals to detect the thickness variation of the recording medium.

44. The optical pickup as recited in claim 39, wherein the thickness of the recording medium is a distance between a light incident surface of the recording medium and an information recording surface of the recording medium.

45. The optical pickup as recited in claim 39, wherein the optical path changer comprises:

a beam splitter transmitting the light beam from the light source to the recording medium through the objective lens and reflecting the incident light beam through the objective lens to the photodetector by a predetermined ratio.

46. The optical pickup as recited in claim 39, further comprising:

a collimating lens on the optical path between the light source and the optical path changer collimating a diverging light beam from the light source; and

a sensing lens on the optical path between the optical path changer and the light beam division and detection unit condensing the incident light beam.

47. The optical pickup as recited in claim 39, wherein the optical path changer comprises:

a polarization beam splitter selectively transmitting the light beam from the light source to the recording medium and reflecting the incident light beam to the photodetector according to a polarization of the incident light beam; and

a quarter-wave plate disposed on the optical path between the polarization beam splitter and the objective lens changing a phase of the incident light beam.

48. The optical pickup as recited in claim 39, wherein the thickness variation detection circuit further comprises:

a gain controller amplifying at least one of the first and second detection signals by a predetermined gain factor *k* prior to subtracting the second detection signal from the first detection signal, adjusting an offset of the thickness variation signal.

49. The optical pickup as recited in claim 39, wherein the light beam division and detection unit comprises:

a light beam splitter comprising a first section and a second section dividing the incident light beam into the first light beam portion and the second light beam portion around the first light beam portion; and

a photodetector receiving and photoelectrically converting the first and second light beam portions into the first and second detection signals, respectively.

50. The optical pickup as recited in claim 39, wherein the first section transmits the first light beam portion of the incident light beam or diffracts the first light beam into a 0^{th} -order beam and the photodetector receives the transmitted or diffracted first light beam.

51. The optical pickup as recited in claim 39, wherein the second section diffracts the second light beam portion of the incident light beam into a $+1^{st}$ -order or -1^{st} -order beam and the photodetector receives the diffracted second light beam.

52. The optical pickup as recited in claim 39, wherein the light beam splitter comprises in the first section a through hole, a direct transmit portion, or a hologram pattern to diffract the incident light beam and to transmit a resulting 0^{th}-order light beam to the photodetector, and comprises in the second section a hologram pattern to diffract the incident light beam and to transmit a resulting $+1^{st}$-order or - 1^{st}-order light beam to the photodetector.

53. The optical pickup as recited in claim 39, further comprising:

a blue-light semiconductor laser emitting the light beam having a wavelength between 400 nm and 420 nm, wherein the objective lens comprises a numerical aperture of at least 0.7.

54. An optical pickup for a recording medium, comprising:

a light source generating and emitting a light beam;

an objective lens focusing the light beam from the light source to form a light spot on the recording medium;

an optical path changer disposed on an optical path between the light source and the objective lens, altering a traveling path of the light beam incident on the recording medium;

a light beam division and detection unit dividing the incident light beam passed through the objective lens and the optical path changer after being reflected from the recording medium into a first light beam portion and a second light beam portion around the

first light beam portion, and detecting first and second detection signals from the first and second light beam portions; and

a thickness variation detection circuit detecting a variation in thickness of the recording medium by subtracting the second detection signal from the first detection signal and outputting a thickness variation signal indicative thereof to compensate for spherical aberration, wherein the optical pickup is exclusive of an astigmatism lens causing astigmatism affecting the light beam passed back through the objective lens, and the optical path changer after being reflected from the recording surface of the optical disc.

09685767.110601